Using hough techniques to find lines and circles

Here we learn how to use opencv's hough lines

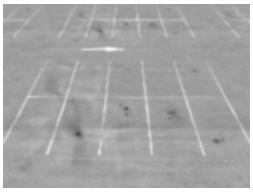
```
(ns opencv3.hough
  (:require
    [opencv3.utils :as u]
    [opencv3.colors.rgb :as color]
    [opencv3.core :refer :all]))
```

```
nil
```

Let's load the target image, and convert it to gray with a bit of blur, so that canny can work on it.

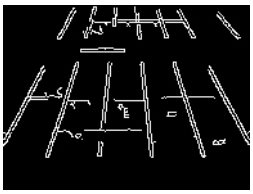
```
(def parking (-> "resources/images/lines/parking.png" imread (u/resize-by 0.3)))
(u/mat-view parking)
```

```
(def gray       (-> parking clone (cvt-color! COLOR_BGR2GRAY) (gaussian-blur! (new-size 3
3) 0 ) ))
(u/mat-view gray)
```



Edges detection is done using canny.

```
(def edges      (-> gray clone (canny! 50 150 )))
(u/mat-view edges)
```



Let's setup the parameters for the hough lines detection.

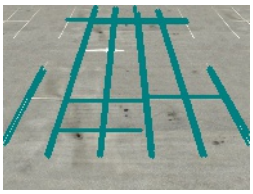
```
(def rho 1) ; distance resolution in pixels of the Hough grid
(def theta  (/ Math/PI 180)) ;   angular resolution in radians of the Hough grid
(def min-intersections 15) ;   minimum number of votes (intersections in Hough grid cell)
(def min-line-length  50) ;   minimum number of pixels making up a line
(def max-line-gap  20 ) ;  maximum gap in pixels between connectable line segments

(def lines (new-mat))
(hough-lines-p edges lines rho theta min-intersections min-line-length max-line-gap)
```

```
nil
```

Now that we have the lines, let's draw them on a clone of the original picture.

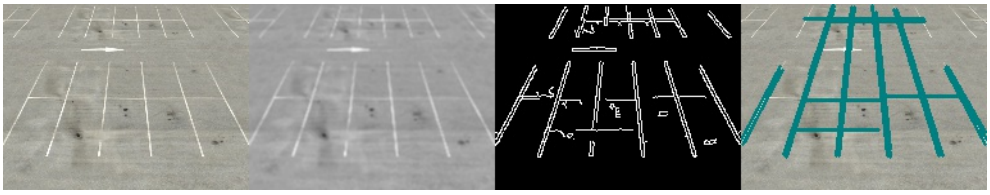
```
(def result (clone parking))
(dotimes [ i (.rows lines)]
(let [ val (.get lines i 0)]
  (line result
    (new-point (nth val 0) (nth val 1))
    (new-point (nth val 2) (nth val 3))
    color/teal
    2)))
```

```
(u/mat-view result)
```



Finally, output all the intermediate images used in this guide. Let's not forget that hconcat and vconcat need all the pictures to be in the same format, in our case, the same number of channels. We convert back *gray* and *edges* with the proper number of channels.

```
(u/mat-view (hconcat! [
  parking
  (-> gray clone (cvt-color! COLOR_GRAY2RGB))
  (-> edges clone (cvt-color! COLOR_GRAY2RGB))
  result] ))
```



Finding only pockets on a pool table

```
(def pool
  (->
    "https://raw.githubusercontent.com/badlogic/opencv-fun/master/data/topdown-6.jpg"
    u/mat-from-url
    (u/resize-by 0.5)))
(u/mat-view pool)
```

```
(def gray (-> pool clone (cvt-color! COLOR_BGR2GRAY)))
(def minRadius 14)
(def maxRadius 18)
(def circles (new-mat))
(hough-circles gray circles CV_HOUGH_GRADIENT 1 minRadius 120 10 minRadius maxRadius)
```

```
nil
```

```
(def output (clone pool))
(dotimes [i (.cols circles)]
  (let [ circle (.get circles 0 i) x (nth circle 0) y (nth circle 1) r (nth circle 2)  p
(new-point x y)]
  (opencv3.core/circle output p (int r) color/red-2 1)))
(u/mat-view output)
```